

**ENVIRONMENTAL ASSESSMENT**  
**Case File No. : AA-082264**  
**AK-040-EA00-016**

**Type of  
Action:** Remove Physical Hazards at Red Devil Mine site.

**Location:** Near Red Devil, Alaska, Secs. 5, 6, 7, and 8, T. 19 N., R. 44 W., Seward Meridian

**Applicant:** Bureau of Land Management  
Anchorage Field Office

**Prepared  
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**Date:** June 9, 2000

**I. INTRODUCTION**

The Red Devil Mine is located about 250 air miles west of Anchorage, Alaska. The nearest communities are Sleetmute, six miles to the southeast, and Red Devil, about two miles to the northwest. The site is bisected by Red Devil Creek, which flows northeast about 0.3 miles to the Kuskokwim River.

The Red Devil mercury mine was operated sporadically from 1933 until 1971. During its operational life approximately 35,000 flasks of mercury were produced (76 pounds per flask). During the late 1980's and early 1990's, environmental site investigations have been completed by the Alaska Department of Environmental Conservation (ADEC), U.S. Environmental Protection Agency (EPA), and BLM. In 1989, BLM removed or neutralized site chemicals and electrical transformers and posted site warnings to restrict site access. Final environmental remediation action will address mercury, antimony, and arsenic leaching from tailing piles and settling ponds.

In 1999, a physical hazards inventory was conducted. The site covers about 45 acres and consists of a surface mining area, three adits, five inclined shafts, three tailing piles, three settling ponds, five large fuel tanks, drum storage areas, the remains of approximately 18 buildings used for housing, laboratory, mill, steam plant, and chemical storage sheds. Of particular concern are the hazardous openings (adits and inclined shafts). With the exception of the main shaft and the retort adit, the remaining shafts and adits are surrounded by thick vegetation (mostly alders). In addition to foliage overgrowth, three decades of deterioration prompted by harsh weather conditions have filled all of the hazardous opening with debris which prevented further visual inspection.

**A. Need for the Proposed Action:**

Abandoned mine lands (AML) sites on Federal lands, particularly those resulting from hardrock (lode) mining, can be major sources of public safety hazards. The Proposed Action will eliminate the hazardous openings and, therefore, the public safety hazards associated with previous mining activity at the Red Devil mine site.

**B. Conformance With Land Use Plan:**

The lands are within the boundary of the Alaska Southwest Planning Area Management Framework Plan (MFP), dated November 25, 1981. The Proposed Action is in conformance with the land use plan, even though it is not specifically provided for, because it is clearly consistent with the Watershed (W-1.1) Activity Objective of the Southwest MFP which states that BLM is to "maintain water quality in accordance with the Alaska Water Quality Standards".

**C. Relationship to Statutes, Regulations, Policies, Plans, or Other Environmental Analyses:**

The BLM addresses public safety hazards at abandoned mines through the Abandoned Mine Inventory and Remediation Program. The BLM initiated a national effort in 1993 to inventory the safety and environmental hazards posed by abandoned mines on public lands.

**II. PROPOSED ACTION AND ALTERNATIVES**

**A. Proposed Action:**

The Red Devil mine is located about two miles southeast of the community of Red Devil, Alaska (Secs. 5, 6, 7, and 8, T. 19 N., R. 44 W., Seward Meridian. The BLM proposes to eliminate the site's horizontal and vertical openings (adits and shafts) associated with previous mining activity. They are considered public safety hazards.

The initial phase of the proposed project (Phase I) will commence with a detailed inspection of each inclined shaft and adit. This will take place over a three to four day period beginning June 13, 2000. All activities will be coordinated with the BLM (Anchorage Field Office) Environmental Protection Specialist. All site personnel will be briefed on site hazards. The Project leader will review the site safety and health plan. Current site entry policy requires the use of rubber disposable boots or proper decontamination of non-disposable rubber boots. Any accidental release of fuel or oil from heavy equipment will be remediated according to federal and state laws and regulations.

The site will be accessed by flying personnel and equipment by fixed wing aircraft to the Red Devil airstrip from Aniak. The field team includes two BLM personnel and one engineer from the State of Alaska, Department of Natural Resources. A pickup truck will be used to drive from the airstrip, or local lodge, to the site. We may also hire a small boat and operator to access the site from the lodge. All work sites in this project are located within the former mine area which was stripped of soil and vegetation during most of the years it operated. Much of the area beyond the main shaft now has a healthy population of alders as well as an assortment of low-lying brush.

A John Deere 450 C crawler dozer with backhoe will be employed to access each opening. Brush, alders and other debris will be removed from the collar of each shaft so a visual inspection can be made. In some cases, the opening may be readily inspected and not require dozer access until future remediation efforts have begun. The main shaft is accessible by road, but most openings are located in areas ranging from light to dense vegetation (mostly alders). The most distant openings are about ¼ mile from road access. If the openings cannot be readily

inspected, a trail will be blazed through the brush using portions of the old road system (now overgrown with alders) where practical. This clearing of brush is necessary to provide access for the backhoe.

Once the backhoe reaches a site, we anticipate an initial maximum surface disturbance of about 250 square feet around the opening. We will determine the dimensions of the opening; degree of incline; depth to water table; character of the bedrock, including rock type, degree of weathering and stability; and whether collar timbers will provide adequate roof support for the placement of physical barriers. This information will be used to determine the appropriate closure method. A cost estimate can then be calculated for each hazardous opening. Metal, steel pipe, rails, concrete, and other like structural material found in the mine opening will be broken down and buried in the opening. Until permanent closure is achieved, fencing and appropriate warning signs will be placed around the perimeter of all open shafts.

In some cases, an opening may be a candidate for immediate backfilling in such a way as to provide a permanent and complete blockage of the shaft. Candidates for this type of remediation will likely be small-diameter shafts that have some degree of natural collapse. The amount of material needed to fill the opening will also be a factor in the decision to backfill. Rock material mined from the shaft will be the primary material source. However, waste rock from additional on-site locations, devoid of vegetation, may be needed. Disturbance will be limited to previously disturbed areas only.

All suitable surface soil will be salvaged from each site disturbed and will be stockpiled until final remediation efforts have been achieved. The soil will be spread uniformly over the disturbed areas and left with a rough surface without depressions where water will collect.

During Phase I, appropriate closure methods will be determined for the horizontal openings (adits). Backfill material placed at least three feet into the mine entry may be an immediate and suitable solution for closing these openings. Available waste rock from around the opening and from other on-site locations will be used. The adits are located near a previously disturbed area devoid of vegetation. Infill material from this location will be used to avoid unnecessary disturbance to the regrowth vegetation.

Phase II of this project will occur during the summer field season of FY 2001. The remaining vertical openings (those not closed with backfill material) will be sealed to prevent entry. One of two methods will be employed to remove the hazard depending on: 1) the characteristics of the respective opening, 2) environmental

concerns associated with construction, 3) access for equipment, and 4) availability of materials.

Large-diameter shafts driven into competent bedrock will have a concrete cap placed over the opening. The cap shall be large enough so that at least two feet of the seal rests on the bedrock in all directions (the seal will be at least four feet wider than the opening of the mine shaft). The concrete cap may be prepared in place or it may be preformed and sling-loaded to the opening by helicopter. In place preparation will involve the transportation of materials and concrete mixing equipment to each site using the trail system established for backhoe access. A concrete cap will provide total elimination of the hazard and can be expected to remain intact for up to 100 years. There is an added safety benefit in using the cap method in that contracted employees and operators do not need to work in the abandoned shafts.

Shafts not deemed appropriate candidates for backfill or placement of a concrete cap will be closed using a steel grate anchored with expansion-type rock bolts, embedded at a depth of 4.5 inches. If the bedrock is soft or excessively fractured, 3/4-inch anchor bars will be used with a minimum anchoring depth of eighteen inches. The grate will have an angle-iron frame fitted continuously around its perimeter. As with the concrete cap, the grate may be prepared in-place or it may be preformed and sling-loaded to the opening by helicopter.

**B. No Action Alternative:**

Under the No Action Alternative, the BLM will continue to implement current management practices. The public will continue to be exposed to potential abandoned mine physical hazards.

**III. AFFECTED ENVIRONMENT**

Much of the former road and trail system used to access each shaft is overgrown with alders and assorted vegetation.

**A. Critical Elements:**

The following critical elements of the environment are either not present or would not be affected by the Proposed Action or the No Action Alternative:

Air Quality  
Areas of Critical Environmental Concern  
Cultural Resources  
Environmental Justice  
Farm Lands, Prime or Unique  
Floodplains

Invasive, Non-native Species  
Native American Religious Concerns  
Subsistence  
T&E Species  
Wetlands/Riparian Zones  
Wild and Scenic Rivers  
Wilderness

**1. Air Quality:**

Ambient air quality at the site was tested with a mercury vapor monitor and photo ionization detector during site investigations in 1988 and 1999. Results indicated mercury and Volatile Organic Compounds were within permissible exposure levels. Surface soil mercury concentrations exceed EPA and ADEC standards for inhalation hazards for long-term exposures.

**2. Cultural Resources:**

Aboriginal inhabitants of this area were the Kuskokwim River Ingalik (VanStone and Goddard 1981). Traditionally, habitation sites were located along rivers or major streams which provided food and routes of transportation. While areas such as the Red Devil mine may have been used by the aboriginal inhabitants, there is little potential for archaeological remains to have survived the extensive mining activity conducted here. Mercury was discovered at this site in 1933. Mining began in 1939 and, aside from a short hiatus during World War II, continued under several operators until 1972 (Oswalt 1980). In spite of the relatively recent activity at this mine, none of the structures remain intact, having succumbed to the ravages of harsh weather and human scavenging. None of the structures have retained sufficient integrity to be eligible for inclusion into the National Register of Historic Places. Therefore, no further consultation is necessary under Section 106 of the National Historic Preservation Act.

**3. Subsistence Uses Under Section 810 of ANILCA:**

At this time, the Proposed Action will not significantly restrict subsistence uses, decrease the abundance of subsistence resources, alter the distribution of subsistence resources, or limit subsistence user access from currently existing conditions.

**4. Threatened and Endangered Species:**

The threatened and endangered species evaluation, dated May 23, 2000, is located in case file AA-082264. The evaluation covers both plants and animals.

**5. Wastes, Hazardous or Solid:**

Friable and non-friable asbestos are on site. Mercury, arsenic, lead, and antimony have been identified in site soils and tailings. Some site soils may be contaminated with waste oil, PCBs, solvents, and various mineral processing chemicals. Refer to the Limited Waste Removal Action Report, Red Devil Mine, Red Devil, Alaska located in case file AA-081686.

**6. Water Quality, Drinking or Ground:**

Surface and ground water at the site are not used for drinking water purposes. Ground water at the site, with respect to drinking water standards, may be impacted by metals in tailings, other site contaminants, and by the site geology. Surface water samples taken on site, up stream, and down stream show elevated levels of metals. The local geology and metalliferous lode deposits therein are the source of detectible quantities of metals in surface waters. Water samples from Red Devil Creek exceed EPA drinking water standards for mercury. Water samples from the Kuskokwim River near the site meet EPA drinking water standards for metals analyzed. Surface waters of this region support the local fishing industry and subsistence use. Water quality data are located in case file AA-081686.

**B. Lands:**

The lands are encumbered by the following:

- 1) Kuskokwim Corporation Village Selection F-14936-A (excluded mining claims),
- 2) Kuskokwim Corporation Village Selection F-14936-A2 (selected all unpatented lands not selected by F-14936-A),
- 3) Calista Corporation Regional Selection AA-70149, and
- 4) State Selection AA-74575.

There are no easement concerns.

**C. Wildlife:**

Moderate to low densities of moose occur in the areas associated with willow shrubs and mixed forest. Predators such as wolves, black and brown bear, lynx, and marten may frequent the area, but are highly mobile and would be encountered for short periods of time. Resident and migrant land birds nest and feed in shrub (alder and willow) and adjacent forest habitats. Bluffs along the Kuskokwim River at the mine site may provide nesting habitat for raptors including rough-legged hawk, bald eagle and peregrine falcon. Raptor surveys on the Kuskokwim River in 1991 did not detect any raptor nests in the area. No other raptor surveys have been done since 1991. There have been no other wildlife surveys completed in this area.

**D. Vegetation:**

The site is within the Kuskokwim Highlands, one of 15 major land resource areas in Alaska (Wahrhaftig 1965). Most of the area has been disturbed in the past and has regrown in alder dominated shrubs. Due to the disturbed nature of the area, weed species could occur on site, but would be limited to the more open and disturbed areas.

**IV. ENVIRONMENTAL CONSEQUENCES**

**A. Impacts of the Proposed Action:**

**1. Air Quality:**

Metals in site soils could enter the air by vaporization or as particulates during disturbance. People trespassing on the site could be exposed to site contaminants by inhalation. Digging, walking, or operating heavy equipment could disturb the soil. Suspect friable asbestos on the retort building may be an inhalation hazard to site visitors.

**2. Water Quality, Surface or Ground:**

Surface and ground water quality could be further degraded if tailings/soils used to backfill the mine shafts have leachable quantities of mercury or other contaminants.

**3. Wastes, Hazardous or Solid:**

Contaminated soils and tailings may classify as hazardous or contaminated solid wastes if excavated, and may present a human health hazard. Only a limited number of surface sampling points have been characterized.

Ideally, fuel, oil, or other pollutants from the use of heavy machinery will not be released by this operation, but a leak could occur and contaminate the lands.

**4. Wildlife:**

The impacts of clearing alder shrubs from the over grown road bed and clearing shrubs for access from the road to the openings of the adits or shafts will cause some loss of shrub habitat. It may also cause a disturbance of moose and land birds which use those habitats. The noise associated with the backhoe will temporarily displace wildlife from nearby, unaffected shrub and forest areas. Displaced animals may be more vulnerable to predators and may cause breeding birds to abandon nests and breeding territories, increasing mortality. All areas to be cleared for access have been previously disturbed by mining activity.



**5. Vegetation:**

The existing overgrowth of vegetation on the road system would be cleared of alders and other shrubs to allow passage of excavating equipment. If the roots are not disturbed, the alders and willows would start to regrow during the same growing season as soon as the disturbance ceases. If the roots are destroyed, the regrowth would be slower as the alders and willows would have to recolonize from the surrounding area..

**B. Impacts of the No Action Alternative:**

Under the No Action Alternative, current management practices would continue to expose the public to the mine-related physical hazards at the site. AML sites on Federal lands, particularly those resulting from hardrock (lode) mining such as the Red Devil mine, can be major sources of public safety hazards. There are no impacts to vegetation, wildlife, wastes (hazardous or solid), air quality or water quality (surface or ground) under the No Action Alternative.

**C. Residual and Cumulative Impacts:**

No residual or cumulative impacts are expected to be incurred by the implementation of the Proposed Action

**D. Mitigation Measures:**

**1. Wildlife:**

Clearing for access to the site should be kept to the minimum needed to complete the remediation project. Top soil should be spread, if available, on sites disturbed by the Proposed Action to promote the natural revegetation and reduce erosion potential.

**2. Vegetation:**

Root removal during road clearing should be avoided if possible. This will allow more rapid regeneration of the site with less chance of soil erosion and weed infestation.

**V. CONSULTATION AND COORDINATION**

**A. Persons and Agencies Consulted:**

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